

IN THE CLAIMS

Upon entry of the present amendments, the status of the claims will be as is shown below. This listing of claims replaces all previous versions and listings of claims in the present application.

1. (Currently Amended) An autofocus system for a camera, comprising:
 - a contrast focus detector which detects a position of a focusing lens group, at which a contrast of an object image which passes through a photographing optical system reaches a maximum while moving said focusing lens group via a lens driver, said contrast focus detector defining said position of said focusing lens group at which said contrast of said object image reaches a maximum as a contrast in-focus position;
 - a phase-difference focus detector which separates a light bundle of said object image into two light bundles so that said two light bundles are formed as two object images on a light-receiving element to detect a phase difference between said two object images formed thereon, said phase-difference focus detector defining a position of said focusing lens group at which an in-focus state is obtained for said object as a phase-difference in-focus position; and
 - a controller for moving said focusing lens group via said lens driver to one of said phase-difference in-focus position and said contrast in-focus position, wherein said controller adjusts a moving range of said focusing lens group for detecting said contrast by said contrast focus detector in accordance with a degree of reliability of said phase-difference in-focus position.

wherein said reliability corresponds to a minimum value of a correlation function of said two object images,

wherein said controller moves said focusing lens group to a start position spaced from said phase-difference in-focus position by a first moving amount when said minimum value is smaller than a predetermined value, and by a second moving amount when said minimum value is one of equal to and greater than said predetermined value, so as to detect said contrast while moving said focusing lens group from said start position in a direction toward said phase-difference in-focus position, the absolute value of said second moving amount being greater than the absolute value of said first moving amount.

2. (Cancelled)

3. (Currently Amended) The An autofocus system for a camera,
comprising: according to claim 1,

a contrast focus detector which detects a position of a focusing lens group, at which a contrast of an object image which passes through a photographing optical system reaches a maximum while moving said focusing lens group via a lens driver, said contrast focus detector defining said position of said focusing lens group at which said contrast of said object image reaches a maximum as a contrast in-focus position;

a phase-difference focus detector which separates a light bundle of said object image into two light bundles so that said two light bundles are formed as

two object images on a light-receiving element to detect a phase difference between said two object images formed thereon, said phase-difference focus detector defining a position of said focusing lens group at which an in-focus state is obtained for said object as a phase-difference in-focus position; and

a controller for moving said focusing lens group via said lens driver to one of said phase-difference in-focus position and said contrast in-focus position, wherein said controller adjusts a moving range of said focusing lens group for detecting said contrast by said contrast focus detector in accordance with a degree of reliability of said phase-difference in-focus position,

wherein said reliability corresponds to the inclination angle formed by a correlation line and a horizontal line,

wherein the intersection of said correlation line and said horizontal line corresponds to a minimum value of a correlation function of said two object images,

wherein said controller moves said focusing lens group to a start position spaced from said phase-difference in-focus position by a first moving amount when said inclination angle is one of equal to and greater than a predetermined value, and by a second moving amount when said inclination angle is smaller than said predetermined value, so as to detect said contrast while moving said focusing lens group from said start position in a direction toward said phase-difference in-focus position, the absolute value of said second moving amount being greater than the absolute value of said first moving amount.

4. (Currently Amended) The autofocus system according to claim 1-2, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward infinity from said phase-difference in-focus position.

5. (Currently Amended) The autofocus system according to claim 1-2, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward the minimum photographing distance position from said phase-difference in-focus position.

6. (Original) The autofocus system according to claim 1, wherein said phase-difference focus detector is provided as a unit which is independent of said contrast focus detector.

7. (Currently Amended) An autofocus system, comprising:
a contrast focus detector which detects a position of a focusing lens group, at which a contrast of an object image which passes through a photographing optical system reaches a maximum while moving said focusing lens group via a lens driver, said contrast focus detector defining said position of said focusing lens group at which said contrast of said object image reaches a maximum as a contrast in-focus position;

a phase-difference focus detector which separates a light bundle of said object image into two light bundles so that said two light bundles are formed as two object images on a light-receiving element to detect a phase difference between said two object images formed thereon, said phase-difference focus

detector defining a position of said focusing lens group at which an in-focus state is obtained for said object as a phase-difference in-focus position; and

a controller for moving said focusing lens group via said lens driver to one of said phase-difference in-focus position and said contrast in-focus position,

wherein said controller adjusts a distance from a position of said focusing lens group to said phase-difference in-focus position, for detecting said contrast by said contrast focus detector in accordance with a degree of reliability of said phase-difference in-focus position,

wherein said reliability corresponds to a minimum value of a correlation function of said two object images,

wherein said controller moves said focusing lens group to a start position spaced from said phase-difference in-focus position by a first moving amount when said minimum value is smaller than a predetermined value, and by a second moving amount when said minimum value is one of equal to and greater than said predetermined value, so as to detect said contrast while moving said focusing lens group from said start position in a direction toward said phase-difference in-focus position, the absolute value of said second moving amount being greater than the absolute value of said first moving amount.

8. (Currently Amended) An autofocus method, comprising:

separating a light bundle of an object image into two light bundles so that said two light bundles are formed as two object images on a light-receiving element to detect a phase difference between the two object images formed thereon;

defining a position of a focusing lens group at which an in-focus state is obtained for said object as a phase-difference in-focus position;

detecting a position of the focusing lens group, at which a contrast of an object image which passes through a photographing optical system reaches a maximum while moving said focusing lens group;

commencing a lens driving operation, wherein a distance from said phase-difference in-focus position is controlled in accordance with a degree of reliability of said phase-difference in-focus position, and

defining said position of said focusing lens group at which said contrast of said object image reaches a maximum as a contrast in-focus position,

wherein said reliability corresponds to a minimum value of a correlation function of said two object images,

wherein said focusing lens group is moved to a start position spaced from said phase-difference in-focus position by a first moving amount when said minimum value is smaller than a predetermined value, and by a second moving amount when said minimum value is one of equal to and greater than said predetermined value, so as to detect said contrast while moving said focusing lens group from said start position in a direction toward said phase-difference in-focus position, the absolute value of said second moving amount being greater than the absolute value of said first moving amount.

9. (New) The autofocus system according to claim 3, wherein said phase-difference focus detector is provided as a unit which is independent of said contrast focus detector.

10. (New) An autofocus system, comprising:

a contrast focus detector which detects a position of a focusing lens group, at which a contrast of an object image which passes through a photographing optical system reaches a maximum while moving said focusing lens group via a lens driver, said contrast focus detector defining said position of said focusing lens group at which said contrast of said object image reaches a maximum as a contrast in-focus position;

a phase-difference focus detector which separates a light bundle of said object image into two light bundles so that said two light bundles are formed as two object images on a light-receiving element to detect a phase difference between said two object images formed thereon, said phase-difference focus detector defining a position of said focusing lens group at which an in-focus state is obtained for said object as a phase-difference in-focus position; and

a controller for moving said focusing lens group via said lens driver to one of said phase-difference in-focus position and said contrast in-focus position, wherein said controller adjusts a distance from a position of said focusing lens group to said phase-difference in-focus position, for detecting said contrast by said contrast focus detector in accordance with a degree of reliability of said phase-difference in-focus position,

wherein said reliability corresponds to the inclination angle formed by a correlation line and a horizontal line,

wherein the intersection of said correlation line and said horizontal line corresponds to a minimum value of a correlation function of said two object images,

wherein said controller moves said focusing lens group to a start position spaced from said phase-difference in-focus position by a first moving amount when said inclination angle is one of equal to and greater than a predetermined value, and by a second moving amount when said inclination angle is smaller than said predetermined value, so as to detect said contrast while moving said focusing lens group from said start position in a direction toward said phase-difference in-focus position, the absolute value of said second moving amount being greater than the absolute value of said first moving amount.

11. (New) An autofocus method, comprising:

separating a light bundle of an object image into two light bundles so that said two light bundles are formed as two object images on a light-receiving element to detect a phase difference between the two object images formed thereon;

defining a position of a focusing lens group at which an in-focus state is obtained for said object as a phase-difference in-focus position;

detecting a position of the focusing lens group, at which a contrast of an object image which passes through a photographing optical system reaches a maximum while moving said focusing lens group;

commencing a lens driving operation, wherein a distance from said phase-difference in-focus position is controlled in accordance with a degree of reliability of said phase-difference in-focus position, and

defining said position of said focusing lens group at which said contrast of said object image reaches a maximum as a contrast in-focus position,

wherein said reliability corresponds to the inclination angle formed by a correlation line and a horizontal line,

wherein the intersection of said correlation line and said horizontal line corresponds to a minimum value of a correlation function of said two object images,

wherein said focusing lens group is moved to a start position spaced from said phase-difference in-focus position by a first moving amount when said inclination angle is one of equal to and greater than a predetermined value, and by a second moving amount when said inclination angle is smaller than said predetermined value, so as to detect said contrast while moving said focusing lens group from said start position in a direction toward said phase-difference in-focus position, the absolute value of said second moving amount being greater than the absolute value of said first moving amount.

12. (New) The autofocus system according to claim 3, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward infinity from said phase-difference in-focus position.

13. (New) The autofocus system according to claim 3, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward the minimum photographing distance position from said phase-difference in-focus position.

14. (New) The autofocus system according to claim 7, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward infinity from said phase-difference in-focus position.

15. (New) The autofocus system according to claim 7, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward the minimum photographing distance position from said phase-difference in-focus position.

16. (New) The autofocus system according to claim 8, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward infinity from said phase-difference in-focus position.

17. (New) The autofocus system according to claim 8, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward the minimum photographing distance position from said phase-difference in-focus position.

18. (New) The autofocus system according to claim 10, wherein a direction of movement of said focusing lens group by each of said first moving

amount and said second moving amount is a direction toward infinity from said phase-difference in-focus position.

19. (New) The autofocus system according to claim 10, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward the minimum photographing distance position from said phase-difference in-focus position.

20. (New) The autofocus system according to claim 11, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward infinity from said phase-difference in-focus position.

21. (New) The autofocus system according to claim 11, wherein a direction of movement of said focusing lens group by each of said first moving amount and said second moving amount is a direction toward the minimum photographing distance position from said phase-difference in-focus position.